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Heather Growing Media Test

By DUANE O. CRUMMETT

MANY reference books are rather vague regarding the composition and exact proportion of ingredients in growing mixtures best suited to the cultivation of various species of heather. Because of this fact it was deemed desirable to determine the reaction of a number of varieties of these plants to several growing media of varying composition and pH range.

Well rooted cuttings were carefully lifted from the propagation bed at the Arboretum greenhouses during the last week of November, 1940, selected for uniformity, and placed in flats, 80 or 100 to each flat, depending upon the variety. All flats were placed in the greenhouse for the seven months' duration of the tests. Following are the growing media tested and their pH values at the beginning of the experiment as determined by colorometric means:

Mixture A—Gravel sand; pH 5.9.
Mixture B—One part each of sand, peat moss and soil with one-half part each of leaf mold and rotted cow manure; pH 5.6.
Mixture C—Two parts of peat moss and one part of sand; pH 4.4.
Mixture D—Two parts sedge peat, one part sand; pH 5.3.
Mixture E—Three parts soil, two parts leaf mold, one-half part each of sand and peat moss; pH 5.3.
Mixture F—Mixture E plus the following chemical fertilizer, 2 ounces by volume of super phosphate, 4 ounces bone meal and one-half ounce potassium sulphate per flat; pH 5.4.
Mixture H—Equal parts of soil, sand and peat moss; pH 4.
Mixture I—Equal parts of soil, sedge peat and sand; pH 4.5.
Mixture J—Equal parts of sphagnum moss and sand; pH 5.2.

The following are the chief varieties tested and the mixture used for each:

Erica tetralix alba	A, B, C, D, E, F, I, J
Erica ciliaris Dawn	A, B, C, D, E, F, I, J
Erica vagans Lyonesse	A, B, C, D, E, F, H, I
Erica arborea alpina	A, B, C, D, E, H, I
Erica vagans Mrs. Maxwell	A, B, C, D, E, H, I, J
Erica vagans St. Keverne	A, B, C, D, E
Erica darleyensis	A, B, C, D, E
Calluna vulgaris nana	A, B, C, D, E, H, I, J
Calluna vulgaris minima (Smith's var.)	A, B, C, D, E, F, H
Calluna vulgaris pygmaea	A, B, C, D, E, H

Eighteen other varieties were grown in either three or four different mixtures and gave similar results to the above but are not included in this tabulation.

Dunlap's nutrient solution was applied to Mixture J (sand and sphagnum) and Mixture A (sand) at intervals of approximately two weeks. During the last two months of the test it was also applied to Mixture C. This solution, which consists of one teaspoonful each of potassium nitrate and commercial super-phosphate per gallon of water, is satisfactory for feeding a variety of plants in nutrient culture work.

At the conclusion of the test the following were the most significant results which were apparent:

1. Mixture J (sphagnum and sand) produced better results than any of the other mixtures.
2. Almost equal results were obtained by Mixtures B and E, the relative merits of the two being in the order named.
3. Growth was fairly satisfactory in many cases with Mixtures D, H, and I, but not nearly so extensive. The foliage color was inclined to be lighter green, occasionally assuming a yellowish cast.
4. Mixture C tended to produce chlorotic plants with less extensive growth. The former condition was alleviated by the addition of Dunlap's nutrient solution.
5. Mixture A produced good growth and foliage color at the periphery of the flats but several plants near the center were stunted and chlorotic in appearance. Inadequate aeration of the medium seems the most plausible explanation for this condition which would most likely not have occurred if coarser sand had been employed.
6. Several varieties exhibited extensive differences in foliage color, growth rate and general vigor in the various growing media, indicating a need for rather exacting soil conditions for their successful cultivation; chief among these were *Erica arborea alpina, Erica ciliaris Dawn,* and *Erica tetralix alba.* Other varieties displayed few differences in these respects and gave good results from a practical standpoint in all mixtures, thereby indicating less need of exacting soil conditions for their successful cultivation. These varieties included *Erica vagans Lyonesse, Erica vagans Mrs. Maxwell, Erica vagans St. Keverne, Calluna vulgaris pygmaea, Calluna vulgaris minima* (Smith's variety), and *Calluna vulgaris nana.*
7. Wide tolerance to the addition of chemical fertilizer was exemplified by the several varieties, some exhibiting injury indicating excessive amounts, others growing well after initial loss of several plants.
8. Retention of moisture was best in Mixtures D and J.
9. Among the varieties where flowering took place during the test, it occurred first in Mixture A, then in J, followed closely by those plants in Mixture B and E. Plants in the other media flowered somewhat later in no particular order.

From the above results it has been demonstrated that heather will respond well to soil mixtures containing liberal quantities of leaf mold and peat; that manure is definitely beneficial for good growth; and that a sphagnum and sand mixture has particular possibilities as a growing medium from either a practical or experimental standpoint.

Flowers In England

(EDITOR'S NOTE: We submit the following excerpt from an English manuscript to impress our point that plants, grown only for their ornamental qualities, can contribute materially to the wealth and joy of living. Although this may be more apparent under the trying conditions that must exist in England, it nonetheless applies in like manner and in like degree to those of us who are more fortunately placed.)

WE ARE a stiff-necked people, and it takes something more than bombs to lower our morale. But the powers that be should not overlook the fact that relaxation is just as necessary in wartime as it is in the days of peace. For this reason no apology is needed to draw attention to the invaluable aid that flowers and plants can give in the keeping up of our spirits—and morale. The family leaving its garden dugout in the early hours of the morning is cheered by the fugitive perfume of the rose bed. If the garden had been wholly given over to the culture of vegetables some of the peace and inspiration one draws from a garden of flowers would have been lacking. The more one considers the question, the greater is the conviction that, like books, which were exempted from the purchase tax, flowers and plants are even greater necessities these days. It is highly probable that as time goes on this will be realized by the authorities, and instead of there being apologies for the cultivation of flowers and plants in wartime, there will be an ever-increasing realization that they are just the very two subjects that the public should not be called upon to do without."

Culture of the Blue Poppy

By PERRY B. TRUAX

THE seeds of Meconopsis betonicifolia (var. Baileyi) should be sown in late summer or early fall, as soon as they have ripened, in soil consisting of equal parts of leaf mold, peat moss and sand. This mixture should be spread in a cold frame to a depth of at least three inches and the seed should be sown, not too thickly, over the surface and just gently pressed in with a rake or a hoe—not too firmly. The medium should be kept moist and should be shaded at all times against bright sun. The seed should germinate within two or three weeks and should be protected by the usual glass cover against weather extremes—only extremes. Remove the glass entirely during mild weather, but it should be closed tightly throughout a cold spell. In fact, if the barometer falls below ten above zero, have your gardener throw mats over the frame for additional protection. (I say this because I know the plants will stand that much cold without mats, but am not certain from my own experience how much further it is safe to go). The foliage will appear in the spring and when the plants have reached a height of one to two inches, they should be removed to blooming quarters and maintained in a state of gentle moisture until they are well established, when watering may be done as you would for any garden subject. Of course, they should never be allowed to dry out.

The soil in which they are to be planted should be a good type of garden loam, to which leaf mold, first choice oak, second choice beech, third choice alder (the aim is to produce a degree of acidity) has been added. The soil should be prepared on this formula to a depth of twenty inches—*no fudging.*

In my garden the ideal location is on the east side of a brick wall, where the plants are protected against the hot afternoon sun. They will not thrive on the other side of this wall where they have morning shade and hot afternoon sun. So this question of shade is important. In a hotter and dryer climate I would suggest light shade throughout the day, but it must be where there will not be interference from the roots of the tree providing the shade.

The area must permit of a reasonably good, although not necessarily sharp drainage. My plants are on a gentle slope, but the ground does not dry rapidly. I should consider very rapid drainage a serious objection.

A large planting of rhododendrons sometimes offers a good medium and there is the further advantage of having the foliage to hide the Meconopsis during the time the seed is ripening and the foliage is dying, for it is anything but a thing of beauty at that time.

This plant in nature carries four petals and I have heard of an English grower, a leader in other fields, who takes great pride in his achievement in producing some plants with five. Some of mine have seven petals, with the added charm of being beautifully ruffled, and some of this seed produces plants of that type—so there is your goal, and good luck!

A Spray Schedule for Common Garden Insects and Diseases

(*Continued from June Issue*)

DR. BREAKEY and Dr. Huber have also included a discussion of disease control in their joint paper. As you gardeners already know, one of the best fungicides for the control of a host of diseases is Bordeaux mixture. These authors recommend its use at the 4-4-50 strength (4 lbs. of lime, 4 lbs. of copper sulphate, 50 gallons of water) for the following diseases:

Leaf spots: "Caused by many different species of fungi; characterized by the formation of dead areas in the tissue of the leaves; causes early defoliation and weakens the host plant. Destroy the fallen leaves in fall and early winter, thus destroying an important source of spring infection. Spray about the time the new leaves are one-half open and again when leaves have reached full size."

Hawthorn rust: "A rust fungus that attacks both leaves and twigs. Destroy affected parts. Spray when leaves are one-half grown and again when full grown.

Fir leaf cast—on Douglas fir: "Tips of older needles show yellowish spots during winter. Become mottled with brown in spring and turn reddish brown. Destroy affected needles in spring and spray with freshly prepared Bordeaux mixture 4-4-50, to which is added a ½ per cent summer oil emulsion."

Juniper twig blight: "Tip of twigs die, turning a light tan color. Minute black specks or fruiting bodies develop on affected leaves and twigs. Prune off and burn affected twigs. Spray at two-week intervals in the spring, beginning just after growth starts."

Lilac twig blight: "At first water-soaked, angular spots appear on the leaves. Leaves and blossoms become blighted and blackened. Entire shoots and twig tips wilt and become blackened. Carefully prune out diseased twigs, cutting well below affected area. Spray when disease first appears."

Rhododendron tip blight or die back: "Attacks leaves, flower clusters, and young branches of rhododendron and lilac. Causes light brown blotches on leaves, usually starting at margins and ultimately involving most of leaf areas. Infection advances from flower clusters and leaves into branches causing tip die-back or cankers which eventually cause girdling. Destroy affected flower clusters and remove diseased branches. Spray immediately after flowers fade."

Rose black spot, leaf spots and mildew: "Symptoms are characteristic of other leaf spots and mildew. Bordeaux mixture 4-4-50 is effective when a spreader such as one per cent summer oil emulsion is used, but is objectionable because of residue left on plants."

There are, of course, numerous other insects and diseases which may not be controlled by any of the three above-mentioned sprays. A brief summary of each of these follows:

Forest tent caterpillars: "Lead arsenate at the rate of 2 lbs. per 100 gallons and nicotine sulphate 1-800. (See above for other units of measure to obtain this concentration).

Holly leaf miner: "Dust with 2% nicotine-lime dust as soon as the flies appear on the trees, about May 1st, and if possible, repeat at weekly intervals until flies no longer appear." Make the dust thus:

Nicotine sulphate 40% . . . 2½ lbs.
Hydrated lime . . . . . 50 lbs.

Spruce aphis: "The injury by this species occurs only in early spring when many of the needles may be killed. A nicotine soap spray should be applied in April."

Nicotine sulphate, 40% . . . ½ pint
Water . . . . . 75 gals.
Fish or whale oil soap . . . . 2 lbs.

Red Spider: "(a) Wettable sulphur 5 to 10 lbs. to 100 gallons of water; (b) Lime sulphur (1-50) one gallon of the liquid lime-sulphur or the equivalent of dry lime-sulphur to 50 gallons of water; (c) Oil emulsion 2% with nicotine sulphate 1-800."

Powdery mildews: "Controlled by spraying or dusting with a sulphur fungicide."

Root weevils—Bait: "(a) Commercial apple pomace bait sold under the trade name of 'Go-West'; (b) Bran 5 lbs., water 1 quart, sugar 1 lb., calcium arsenate ½ lb. Dissolve the sugar in the water and then add the poison bran mixture."

Spruce bud weevil: "Cut out and burn the affected terminals."

Elm leaf beetle and other leaf-eating insects: "Spray with lead arsenate, 3 lbs. to 100 gallons of water. To this mixture add 2 pints of fish oil soap as a spreader."

Pyracantha scab: "Causes a sooty black spotting or blotching on fruit and leaves. Spray with lime-sulphur, 1-30, when buds begin to swell and again with lime-sulphur, 1-40, in two or three weeks. If disease is severe, a third application two weeks later may be necessary."

The following is a briefer summary of the material presented in this and the previous installment:

Nicotine-oil
- Aphids—early spring.
- Cypress webber—early spring.
- Cypress tip moth—May 15th.
- Chermes—early spring.
- Holly-bud moth—early May and mid-May.
- Holly scale insects—April.
- Scale insects—early spring.
- Sitka spruce gall—early spring before growth.
- Rhododendron lace bug—May.
- Rhododendron white fly—May.

Lead and Nicotine
- Tent caterpillars—spring and summer.

Nicotine and Lime dust
- Holly leaf miner—May 1st and weekly.

Nicotine and Soap
- Spruce aphis—April.

Sulphur
- Red spider—spring and summer.
- Powdery mildews—spring and summer.

Bait
- Root weevils—April 15th.

Cut out and Remove
- Spruce bud weevils.

Lime-sulphur
- Pyracantha scab—when the buds begin to swell and again two or three weeks later.

Lead Arsenate
- Cotoneaster webworm—spring and summer.
- Cherry and pear slug—spring and summer.
- Holly leaf miner—May 1st and weekly.
- Lilac leaf miner—early May.
- Satin moth—spring and summer.

Lead and Fish-oil Soap
- Elm leaf beetle and other leaf eating insects—spring and summer.

Bordeaux 4-4-50
- Leaf spots—when the new leaves are one-half open.
- Hawthorn rust—leaves one-half grown and again when full grown.
- Fir leaf cast—midsummer.
- Juniper twig blight—just after growth starts and twice weekly.
- Lilac twig blight—spring and summer when it appears.
- Rhododendron tip blight or die back—immediately after flowers fade.
- Rose black spot, leaf spots and mildew—spring and summer.

Bordeaux 2-2-50
- Azalea and rhododendron leaf blister — spring and summer.

Soil Aeration

(Prof. Alex Lauries of Ohio State University, writing in *The American Florist*, has presented a sound thought involving the physical makeup of a garden or greenhouse soil. We are happy to pass it along to you with the further suggestion that charcoal has an effect similar to that of the substances he mentions. —*Editor*)

IN ORDER to provide greater aeration in soils, granulation, or clinging together, of the numerous fine particles must be secured. To obtain this granulation, additions of organic matter are beneficial. Aeration may be obtained by an addition of inert materials, such as cinders or burnt shale, both of which should consist of particles ⅜ inch in diameter or less. Both of these materials are like hard sponges in that they have channels of air within the particle. Sand, on the other hand, loosens the soil, but may not necessarily provide greater aeration, as the sand particle is like a billiard ball; that is, solid internally, hence the soil particles will pack around the sand and no aeration will be obtained.

"Soil aeration is absolutely essential, as roots are unable to absorb water and nutrients without oxygen. Further, roots give off carbon dioxide, and unless this carbon dioxide is removed by the process of circulation no root action will occur. The formation of a granular structure greatly facilitates the removal of carbon dioxide and the entrance of oxygen. The granular structure then is closely tied up with the formation of the large pore spaces which are not found in heavy clay soils."

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